

The invention claimed is:

1. An integrated process for the preparation of paraffin alkylate from a C<sub>4</sub> feed containing isobutane, isobutene, normal butane, butene -1, butene 2, dienes and mercaptans comprising:

removing dienes and mercaptans from said C<sub>4</sub> feed;  
isomerizing a portion of the butene-1 to butene-2;  
separating iso C<sub>4</sub> components from the normal C<sub>4</sub> components;  
hydrogenating a portion of the isobutene in said iso C<sub>4</sub> components to isobutane;  
recombining said normal C<sub>4</sub> components and said iso C<sub>4</sub> components and alkylating isobutane and normal butenes in said recombined C<sub>4</sub> components to produce an alkylate comprising isooctane.

2. The process according to claim 1 wherein said removing of dienes and mercaptans comprises reacting said dienes and mercaptans in the presence of a thioetherification catalyst and hydrogen under thioetherification conditions to form sulfides and fractionating the resultant mixture to separate a heavy portion comprising said sulfides.

3. The process according to claim 1 wherein said isomerizing is carried out in the presence of an isomerization catalyst and hydrogen under isomerization conditions.

4. The process according to claim 1 wherein said separating is by fractionation.

5. The process according to claim 1 wherein said alkylating is carried out in the presence of an acid catalyst under alkylation conditions.

6. An integrated process for the preparation of paraffin alkylate from a C<sub>4</sub> feed containing isobutane, isobutene, normal butane, butene -1, butene 2, dienes and mercaptans comprising:

reacting said dienes and mercaptans in the presence of a thioetherification catalyst and hydrogen under thioetherification conditions to form sulfides and fractionating the resultant mixture to separate a heavy portion comprising said sulfides;

isomerizing a portion of the butene-1 to butene-2 in the presence of an

isomerization catalyst and hydrogen under isomerization conditions;  
separating iso C<sub>4</sub> components from the normal C<sub>4</sub> components by  
fractionation;

hydrogenating a portion of the isobutene in said iso C<sub>4</sub> components to  
isobutane;

recombining said normal C<sub>4</sub> components and said iso C<sub>4</sub> components and  
alkylating isobutane and normal butenes in said recombined C<sub>4</sub> components  
in the presence of an acid catalyst under alkylation conditions to produce an alkylate  
comprising isooctane.

7. A process for the utilization of refinery C<sub>4</sub> streams in the production of  
gasoline comprising the steps of:

(a) feeding hydrogen and a mixed C<sub>4</sub> stream containing normal butane,  
isobutane, 1-butene, 2-butene, isobutene, dienes, mercaptans and C<sub>5</sub>'s to a first  
distillation column reactor containing a bed of thioetherification/ hydrogenation  
catalyst;

(b) concurrently in said first distillation column reactor,

(i) reacting the mercaptans and a portion of the dienes in the presence  
of said thioetherification/ hydrogenation catalyst to produce sulfides,

(ii) reacting at least a portion of said dienes with said hydrogen to form  
mono olefins including additional butenes, and

(iii) separating said sulfides and said C<sub>5</sub>'s from said normal butane,  
isobutane, 1-butene, 2-butene and isobutene by fractional distillation;

(c) removing said C<sub>5</sub>'s and said sulfides from said first distillation column  
reactor as a first bottoms;

(d) removing said normal butane, isobutane, 1-butene, 2-butene and  
isobutene from said first distillation column reactor as a first overheads;

(e) feeding said first overheads containing said normal butane, isobutane, 1-  
butene, 2-butene and isobutene to a second distillation column reactor containing  
an bed of isomerization catalyst;

(f) concurrently in said second distillation column reactor,

(i) isomerizing a portion of the 1-butene to 2-butene, and

(ii) separating the 2-butene and the normal butane from the isobutane,

isobutene and unreacted 1-butene;

(g) removing the 2-butene from said second distillation column reactor as a second bottoms;

(h) removing the isobutane, unreacted 1-butene and isobutene from said second distillation column reactor as a second overheads;

(i) feeding said hydrogen and second overheads containing said normal butane, isobutane, isobutene and 1-butene to a third distillation column reactor containing a bed of hydrogenation catalyst to concurrently;

(i) hydrogenate a portion of the 1-butene and isobutene to form a reaction product comprising butane and isobutane and

(ii) fractionate the reaction product to produce a third overheads; and

(j) removing the normal butane, isobutane, 1-butene and isobutene from said third distillation column reactor as a third bottoms.

8. The process according to claim 7 wherein said second and third bottoms are fed to a cold acid alkylation unit.

9. The process according to claim 7 comprising recovering said third overheads comprising hydrogen, isobutane, 1-butene and isobutene; condensing said third overheads to recover a condensate comprising isobutane, 1-butene and returning said condensate to said third distillation column reactor as reflux.

10. The process according to claim 7 wherein said third distillation column reactor contains a bed of acidic cation exchange resin above said bed of hydrogenation catalyst and a portion of the isobutene is oligomerized to produce diisobutene which is hydrogenated in said bed of hydrogenation catalyst and said diisobutene is removed as a third bottoms and said isobutane, 1-butene and isobutene are removed as a third overheads.

11. The process according to claim 10 wherein said second bottoms and said third overheads are fed to a cold acid alkylation unit.

12. The process according to claim 10 wherein the normal butane, isobutane, 1-butene and isobutene is condensed and a portion is returned to said third distillation column reactor as reflux.

13. The process according to claim 7 wherein said hydrogenation is downflow.